



**M9 ACE**

**ARMORED COMBAT  
EARTHMOVER**

**GYSGT BRUBAKER**



# M9 ACE

◆ TLO's

◆ ELO's

◆ Written Exam

◆ Performance Exam

# Deliberate Risk Management Assessment

A. <u>Mission/Task</u>		M9 ACE Operations		B. <u>Phase:</u>	Crane Shed
D. <u>Prepared By:</u> (Rank, Name)		GySgt Brubaker			
E. <u>Task</u>	F. <u>Hazards</u>	G. <u>Initial Risk</u>	H. <u>Control Measures</u>		
Earthmoving including construction of tank ditches, vehicle fighting positions, and breaching operations	Operator thrown from cab during operation	H	Wear seat belt correctly and wear helmet		
	M9 ACE rolls over	H	Keep all personnel safe distance away while operating, dig in 1st gear only, utilize ground guide while moving on lot		
	Persons are run over by M9 ACE	H	Keep all personnel safe distance away while operating, conduct 360 degree walk around before operation		
	M9 ACE catches on fire	M	Use onboard fire extinguishers and have extras at TA		
	Operator falls while mounting or dismounting equipment	M	Use 3 points of contact and wear safety helmet		
	Operator suffers hearing loss	M	Wear hearing protection (ear inserts or headphones)		
	Operator suffers a head injury	L	Wear a safety helmet		
K. <u>Overall risk level after controls are implemented (circle one):</u>		L	M	H	

# Deliberate Risk Management Assessment

	C. <u>Date Prepared:</u>
	01 May 02
I. <u>Residual Risk</u>	J. <u>How to Implement Controls</u>
M	Instructor demonstrates and supervises correct procedures
M	Instructor demonstrates and supervises correct procedures
M	Conduct operator change or hard stand, designate stand by/break area; Instructors supervise; no equipment on roads or troop trails
L	Inspect serviceability and presence of extinguishers
L	Instructor demonstrates and supervises correct procedures
L	Instructor demonstrates and supervises correct procedures
L	Instructor supervises
L. <u>Approval:</u> _____	

# Deliberate Risk Management Assessment

A. <u>Mission or Task:</u>		M9 ACE Operations		B. <u>Phase:</u>	Crane Shed
D. <u>Prepared By:</u> (Rank, Name)		GySgt Brubaker			
E. <u>Task</u>	F. <u>Hazards</u>	G. <u>Initial Risk</u>	H. <u>Control Measures</u>		
Breach a pre-constructed tank ditch at night utilizing night vision goggles	Operator thrown from cab during operation	H	Wear seat belt correctly and wear helmet		
	M9 ACE could roll over	H	Stockpiles will not be built over 5ft. in height; inspect equipment		
	Persons are run over by M9 ACE	H	No student(unless operating) are allowed on field; do not exceed 2nd gear forward or reverse; Conduct 360 walk around before operation		
	M9 ACE catches on fire	M	Use onboard fire extinguishers and have extras at TA		
	Operator falls while mounting or dismounting equipment	M	Use 3 points of contact; wear safety helmet		
	Operator suffers hearing loss	M	Wear double hearing protection (Ear inserts and headphones)		
	Operator suffers a head injury	L	Wear a safety helmet		
	K. <u>Overall risk level after controls are implemented (circle one):</u>				
L                      M                      H					

# Deliberate Risk Management Assessment

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L. <u>Approval:</u>	

# M9 ACE



# History

- ◆ **NSN: 2350-00-808-7100**
- ◆ **ID: 09599A**
- ◆ **TAMCN: B0589**
- ◆ **Developed after WWII**



# History

- ◆ **Main limitation of work capacity is vehicle weight**
- ◆ **Meet airdrop weight limits**
- ◆ **Concept of adding weight (Ballast) at job site**

# History

## ◆ Cost February 1995

- \$710,194

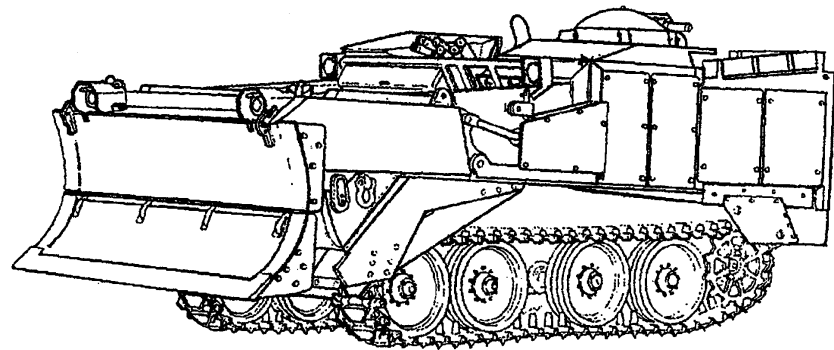
## ◆ Cost June 2002

- \$887,050

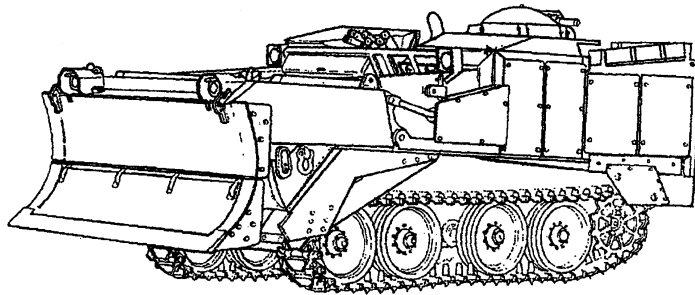


# Characteristics

- ◆ **Armored**
- ◆ **Amphibious**
- ◆ **Diesel powered**
- ◆ **Cummins V903C**
- ◆ **903 cubic inch**
- ◆ **295 hp @ 2600 rpm's**



# Characteristics



- ◆ **Clark transmission**
- ◆ **Six speeds forward and two reverse**
- ◆ **Top speed 30 mph on land**
- ◆ **Unlike conventional dozers**

# Characteristics

## ◆ Main uses:

- **Bulldozing**
- **Rough grading**
- **Excavating**
- **Hauling**
- **Scraping**

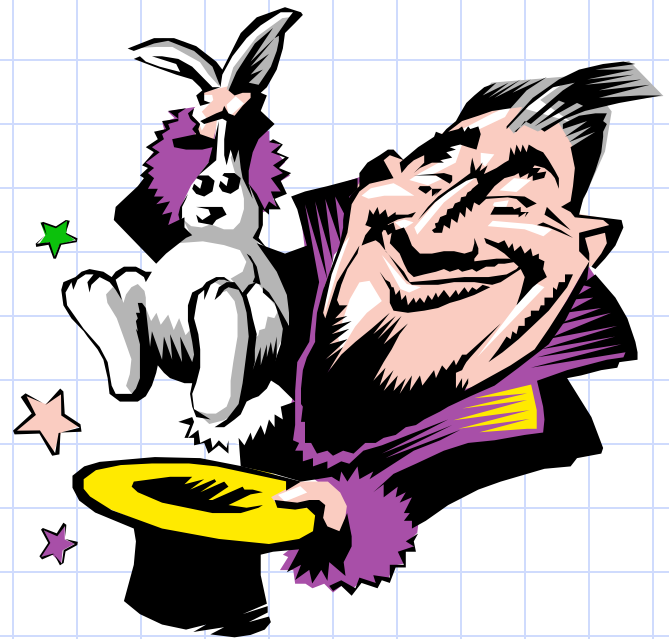
# Characteristics

- ◆ Length 20' 5"
- ◆ Height 8' 9"
- ◆ Width 9' 2"  
(extensions removed)
- ◆ Net vehicle weight  
36,000 lbs.
- ◆ Draw bar pull of  
31,000 lbs.



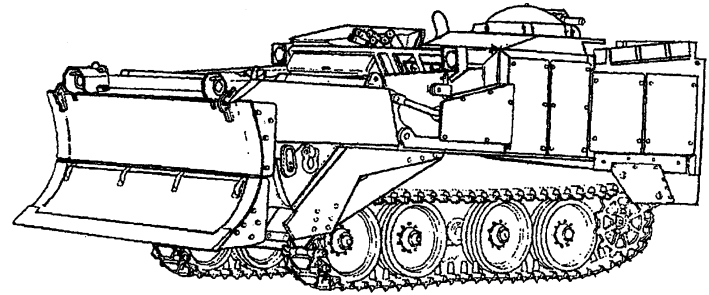
# Characteristics

- ◆ Bowl has a capacity of 8.7 cubic yards.
- ◆ Gross vehicle weight 54,000 lbs.
- ◆ Cruising range of 230 miles.
- ◆ Fording depth 36"



# Characteristics

- ◆ Capable of swimming calm water, 3 mph.
- ◆ Bilge pump discharges 345 gpm max.
- ◆ 11 inches of free board.





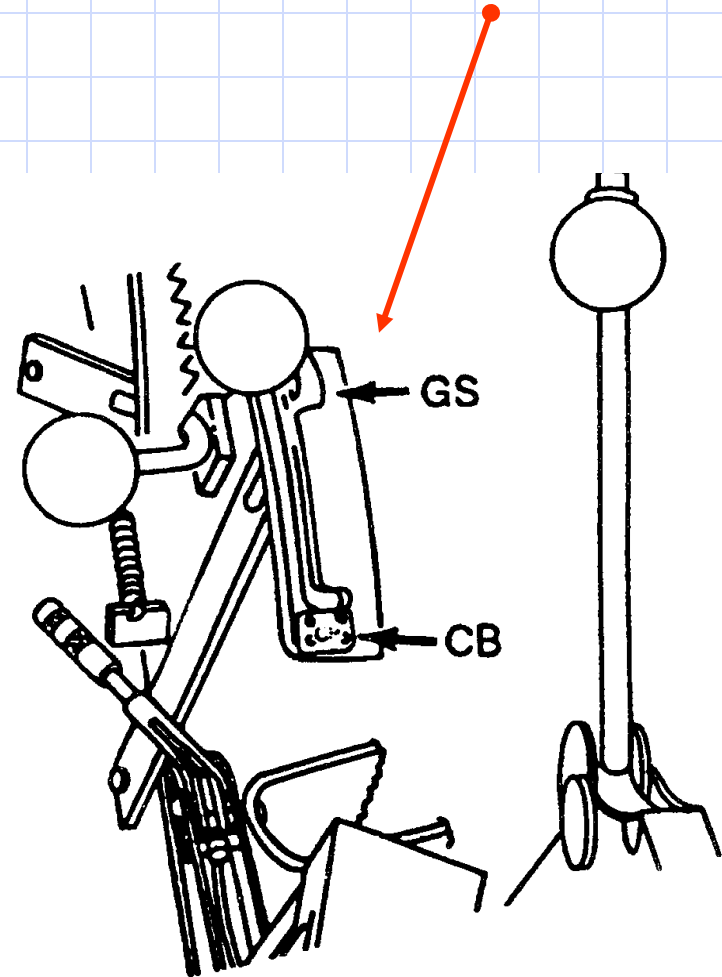
# Steering

## ◆ Gear steer (GS)

- Generally used for traveling (45° turning radius)

## ◆ Clutch brake (CB)

- Used for earthwork and close quarter operations (pivot steering)



# Steering



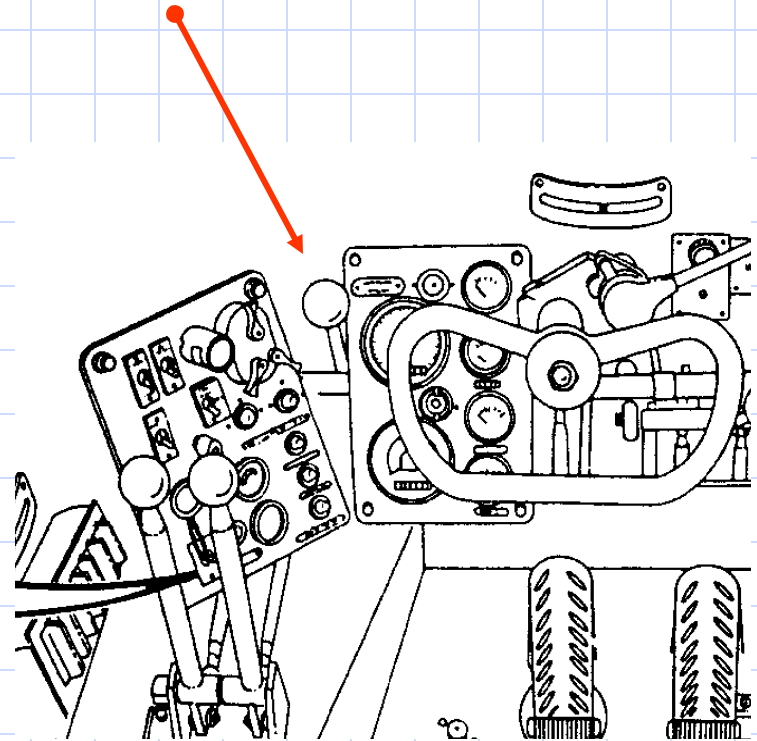
# Suspension

## ◆ Sprung

- Lever up position
- Used when traveling in conjunction with (GS)

## ◆ Unsprung

- Lever down position
- Used when earthmoving and (CB)



# Suspension

## ◆ Sprung mode

- Bump stops extend and limit movement

# Suspension



# Tilt Dozing

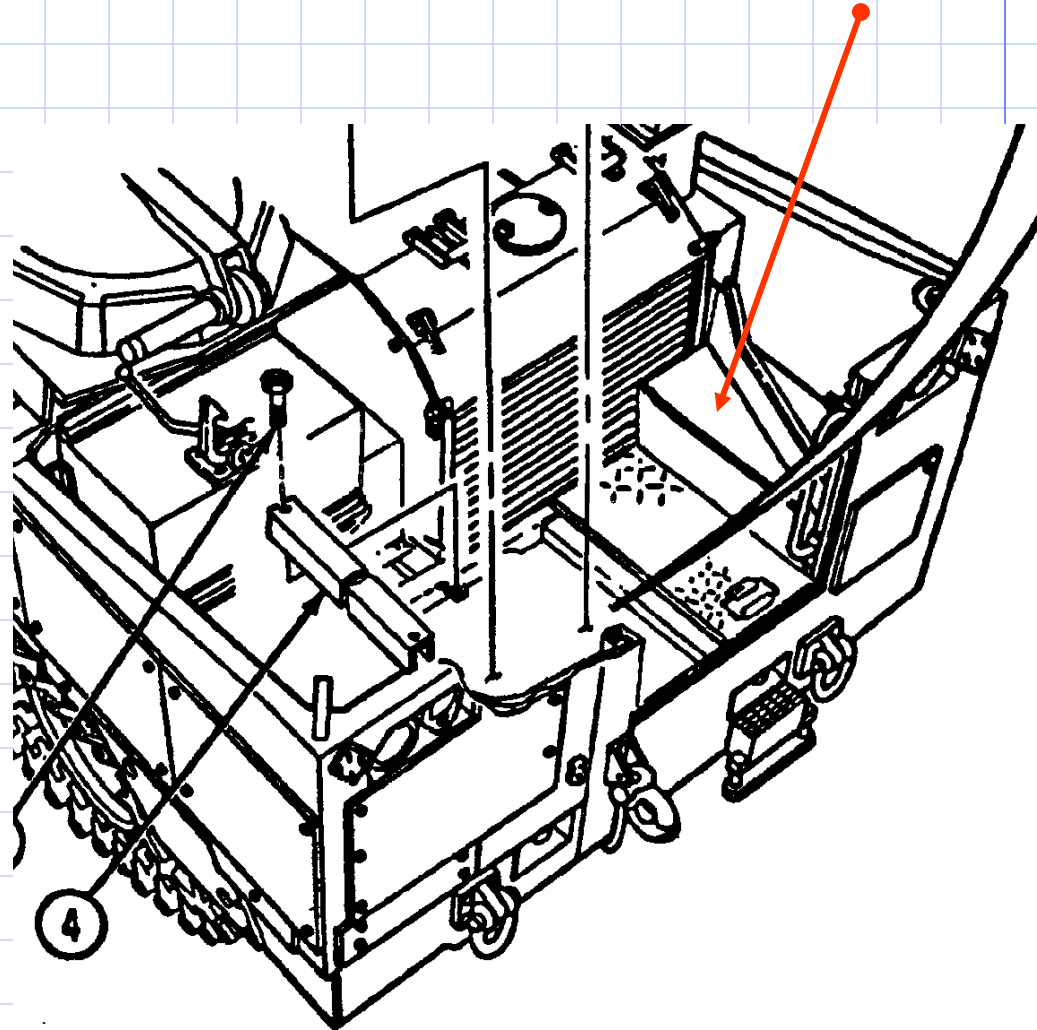
- ◆ Capable of tilt dozing up to  $5^{\circ}$ .
- ◆ Entire machine tilts
- ◆ Un-sprung and GS





# Electrical

- ◆ 24 volt negative ground system
- ◆ 4 batteries in rear of vehicle
- ◆ Heat deflection shield



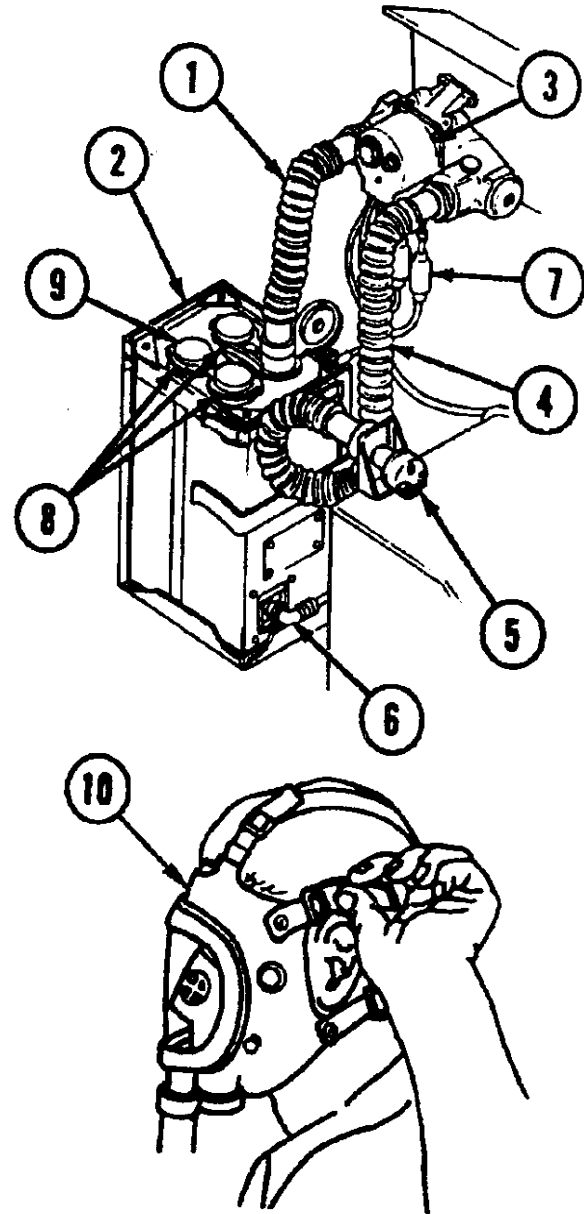
# Electrical





# NBC System

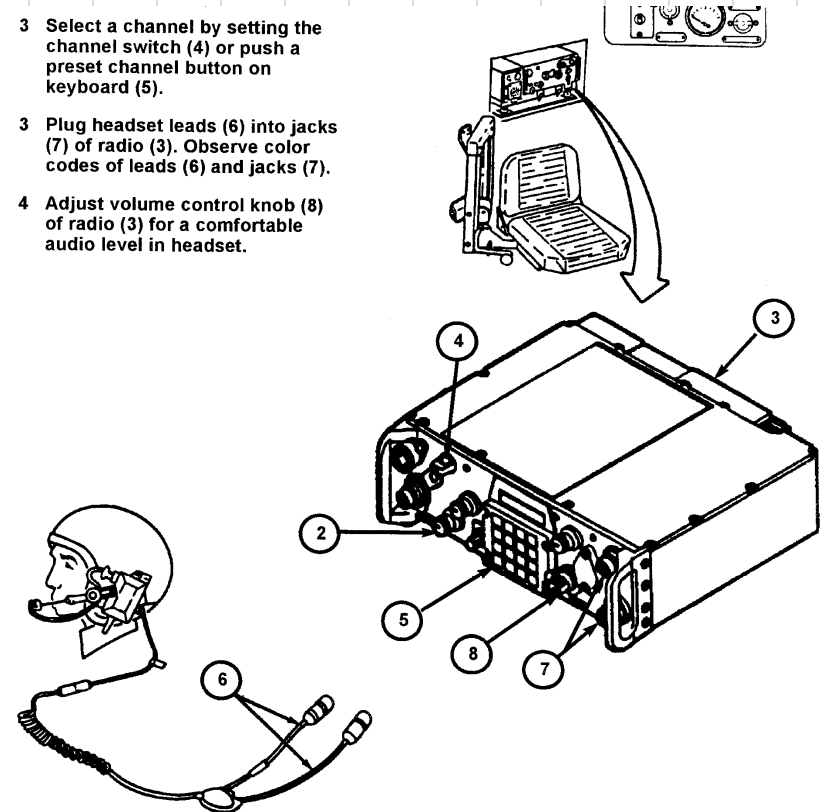
- ◆ Provides protection against biological or chemical attack.
- ◆ Gas-particulate filter unit protects from toxic gases.
- ◆ Air heater and purifier provides warm air to the operator.
- ◆ Chemical-biological mask M25A1.



# Communication System

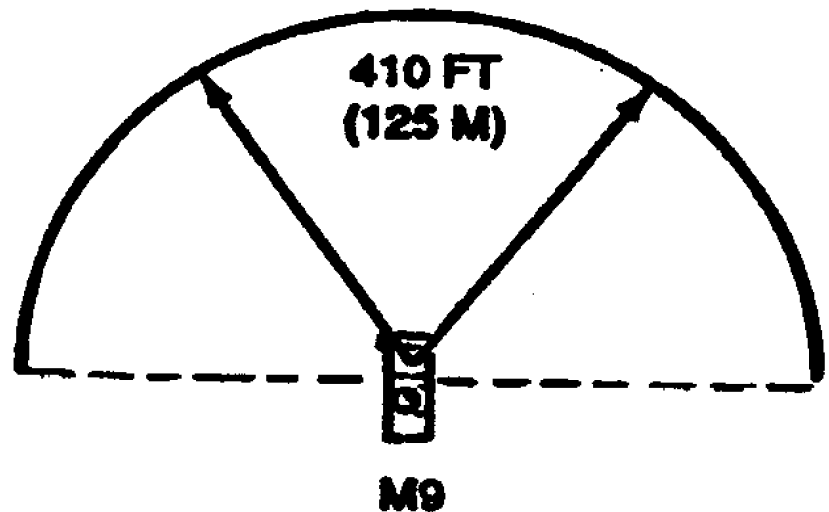
- ◆ Located behind the operator seat.
- ◆ AN/VRC-90
- ◆ Provides two way communication.
- ◆ Antenna adds extra 9.5 feet in height

- 3 Select a channel by setting the channel switch (4) or push a preset channel button on keyboard (5).
- 3 Plug headset leads (6) into jacks (7) of radio (3). Observe color codes of leads (6) and jacks (7).
- 4 Adjust volume control knob (8) of radio (3) for a comfortable audio level in headset.



# Grenade Launcher

- ◆ Holds 8 grenades
- ◆ Maximum travel distance of 410'.
- ◆ Uses an electrical firing pin.

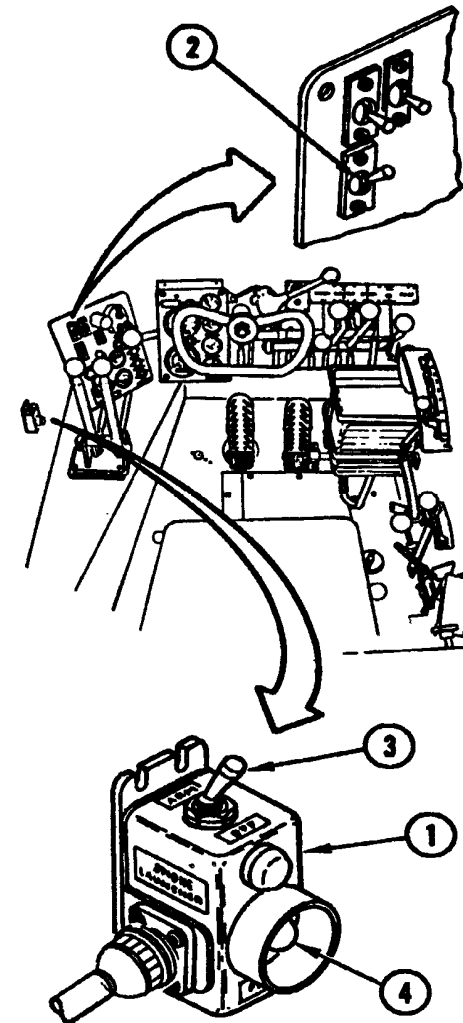


# Grenade Launcher



# Grenade Launcher

- ◆ Switch located on left hand side of operators compartment.
- ◆ Grenades used to shield/screen in tactical situations.



# Grenade Launcher

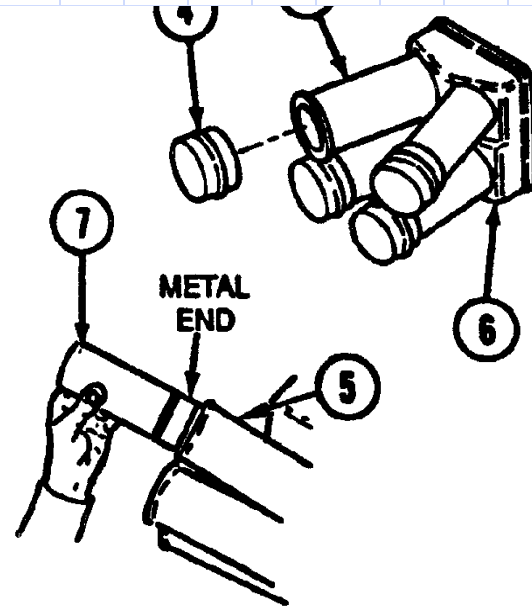
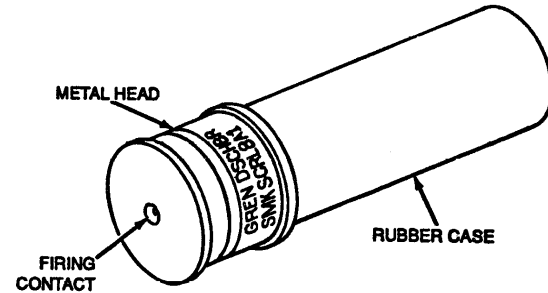


**Firing pin switch**

- ◆ **L8A1**
- ◆ **Load**  
first v  
turn t  
good

◆ **Loaded metal end first with a half turn to ensure good electrical contact.**

<b>AUTHORIZED ROUND</b>	<b>IDENTIFICATION</b>
<b>Grenade, Explosive, Discharge, Smoke Screen, L8A1</b>	<b>Refer to illustration</b>
<b>or</b> <b>Grenade, Explosive, Discharge, Smoke Screen, L8A3</b>	<b>Refer to illustration</b>





# Fuel tank



- ◆ Located behind operator
- ◆ 134 gallons



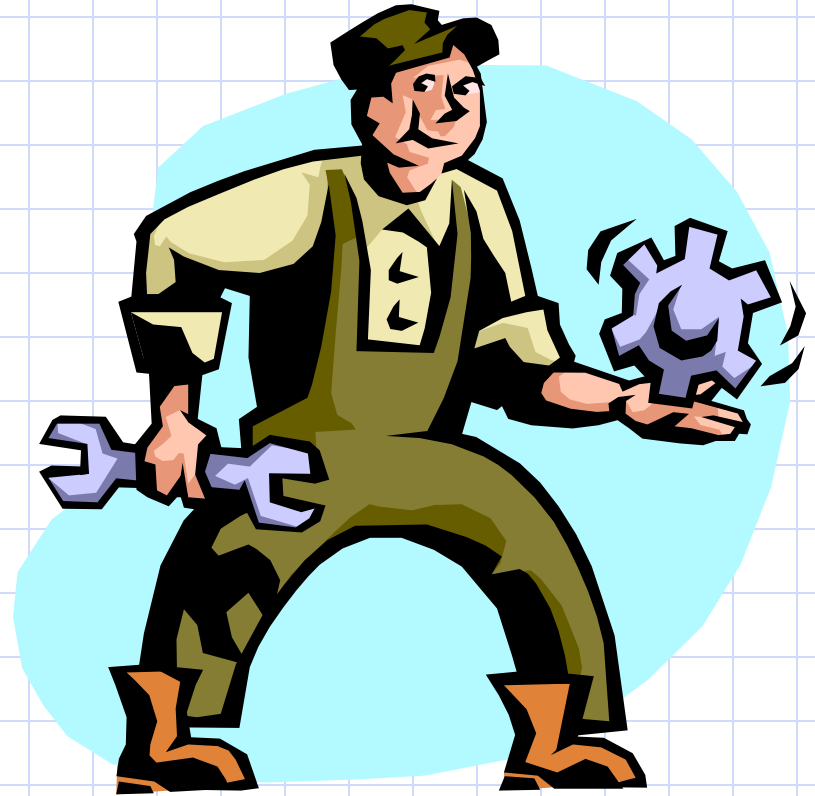
# Questions?

- ◆ Q) What are the 2 types of steering?
- ◆ A) Gear steer & clutch brake.
- ◆ Q) The M9 ACE has a top land speed of...
- ◆ A) 30 mph.



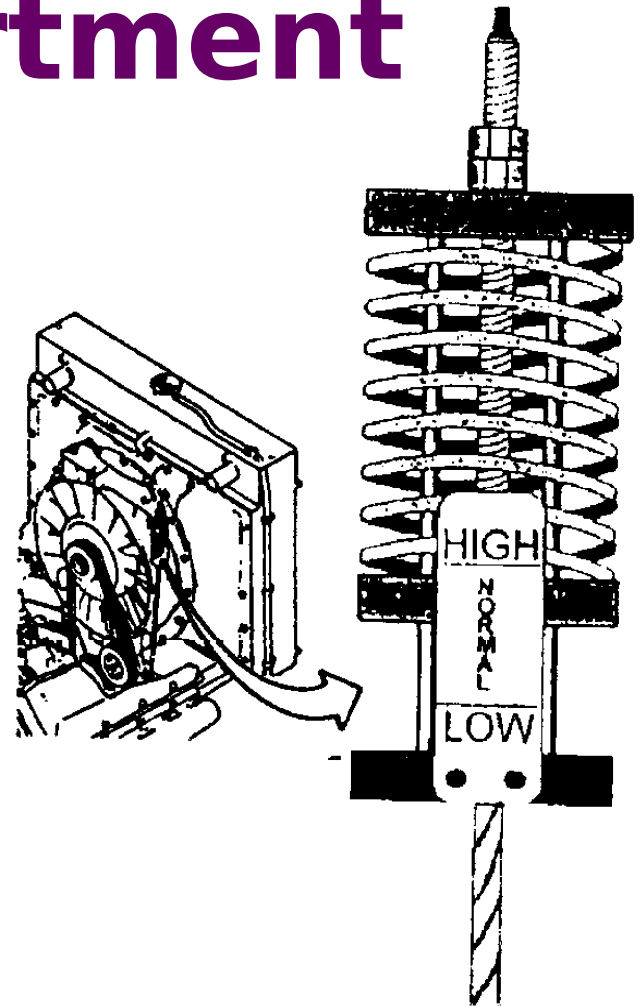
# PMCS

◆ Like with any other piece of gear inspect parts for serviceability and accountability.

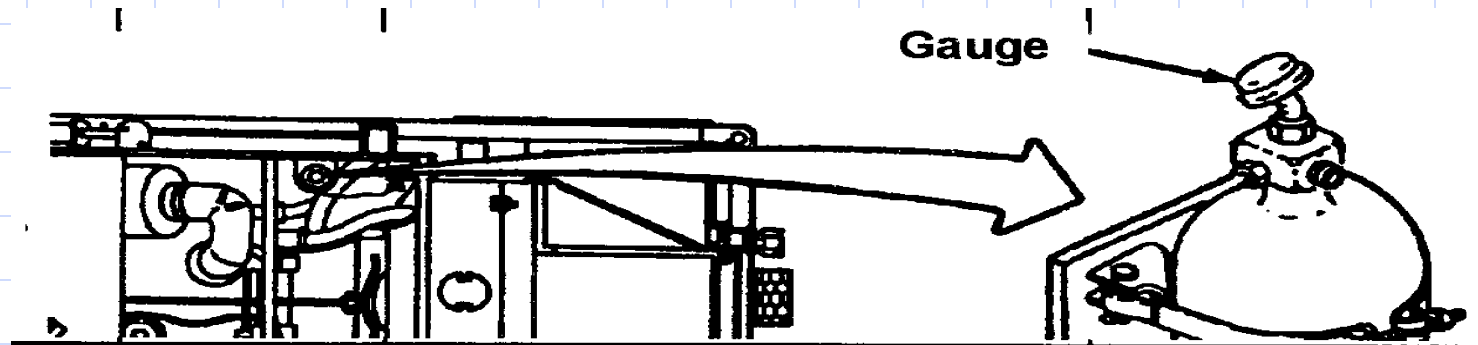


# Engine Compartment

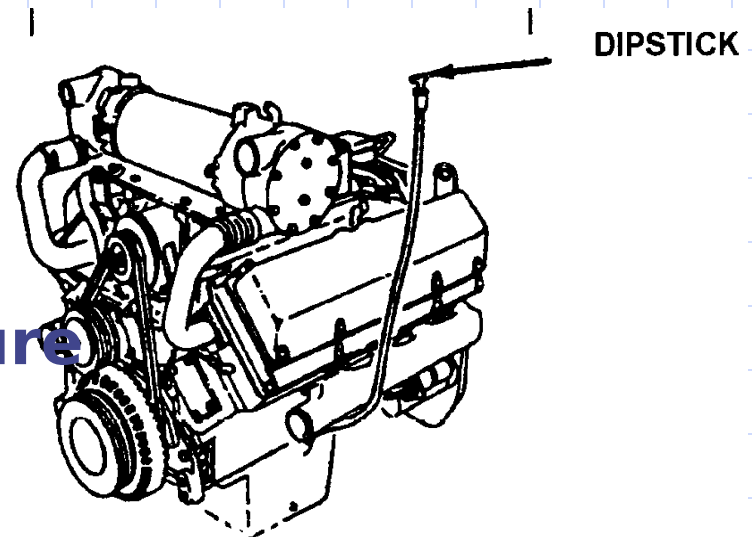
- ◆ Lift up intake grilles and check for any restricted air flow.
- ◆ Fan tensioner in normal range.
- ◆ Generator belt:
  - 1/2" to 5/8"
- ◆ Oil cooler for leaks
- ◆ Fan assembly for damage.



# Engine Compartment



- ◆ Radiator leaks and restrictions.
- ◆ Engine oil level
- ◆ Fire extinguisher pressure
- ◆ Two bottles



# Engine Compartment

## ◆ Check lines and nozzles

- Cracks
- Corrosion

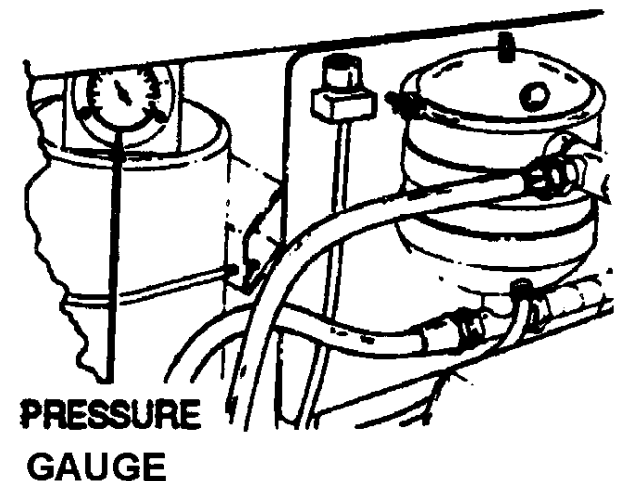
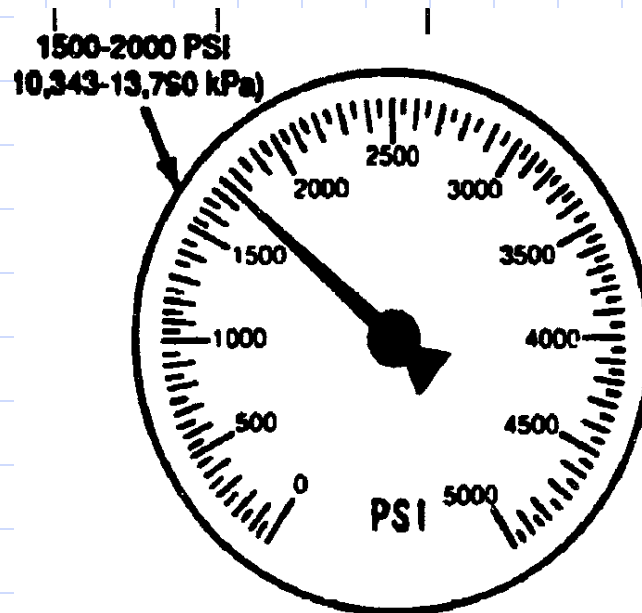
## ◆ Check handles for lead seals

## ◆ Check air cleaner indicator

- In red, replace element

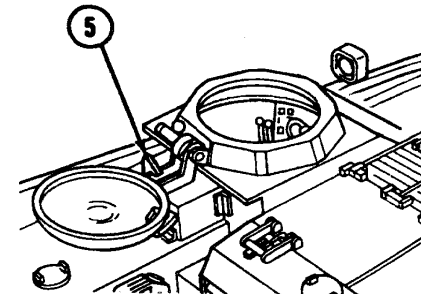
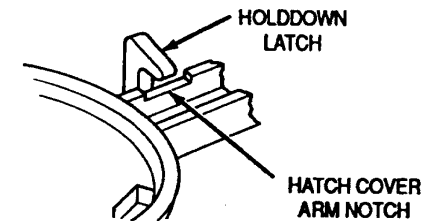
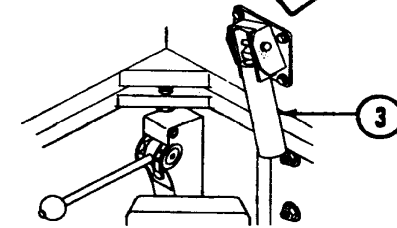
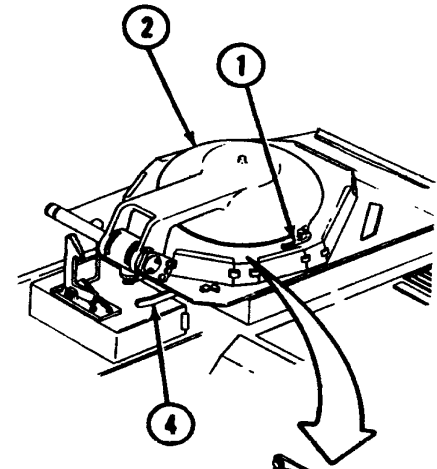
# Hydraulic Pressure Gage

- ◆ Gage should read between 1500 and 2000 psi. before starting.



# Hatch

- ◆ Operate hatch cover to check locks.
- ◆ Check vision blocks and seals.
- ◆ 1<sup>st</sup> detent (15 degrees)
- ◆ 2<sup>nd</sup> detent full open
- ◆ Positive open/locked position



# Hatch

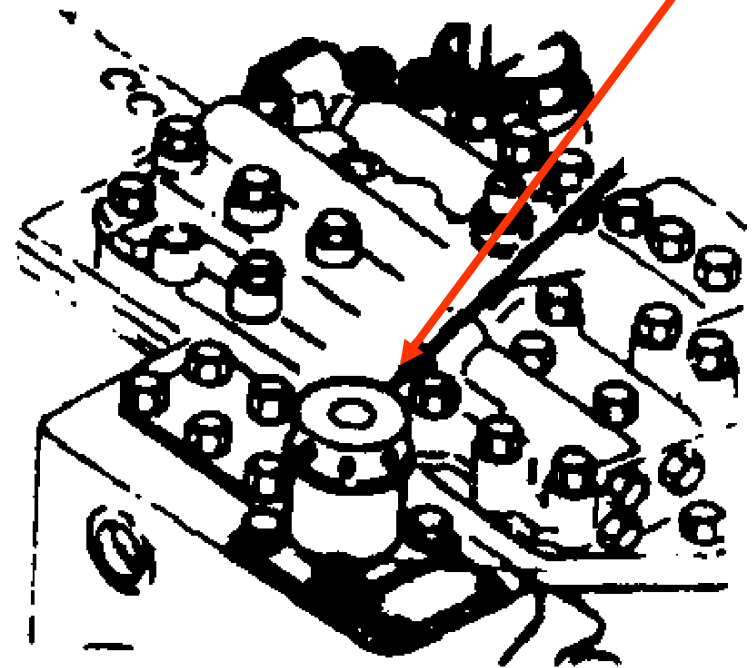
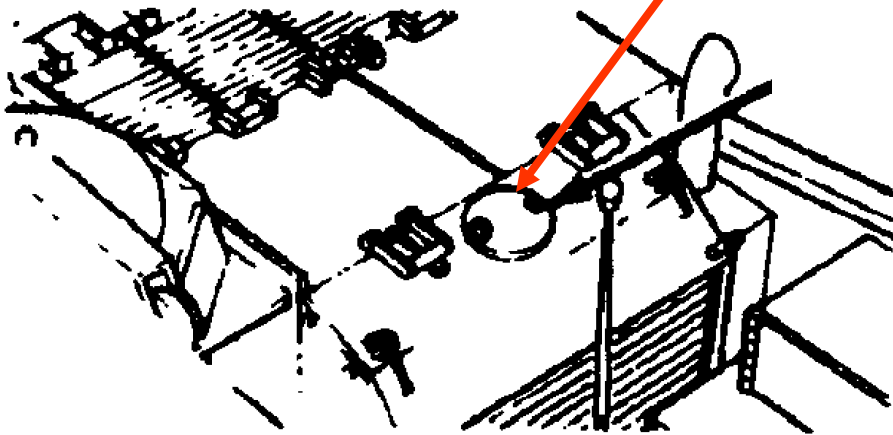
- ◆ Lube hatch fittings with Molybdenum Disulfide





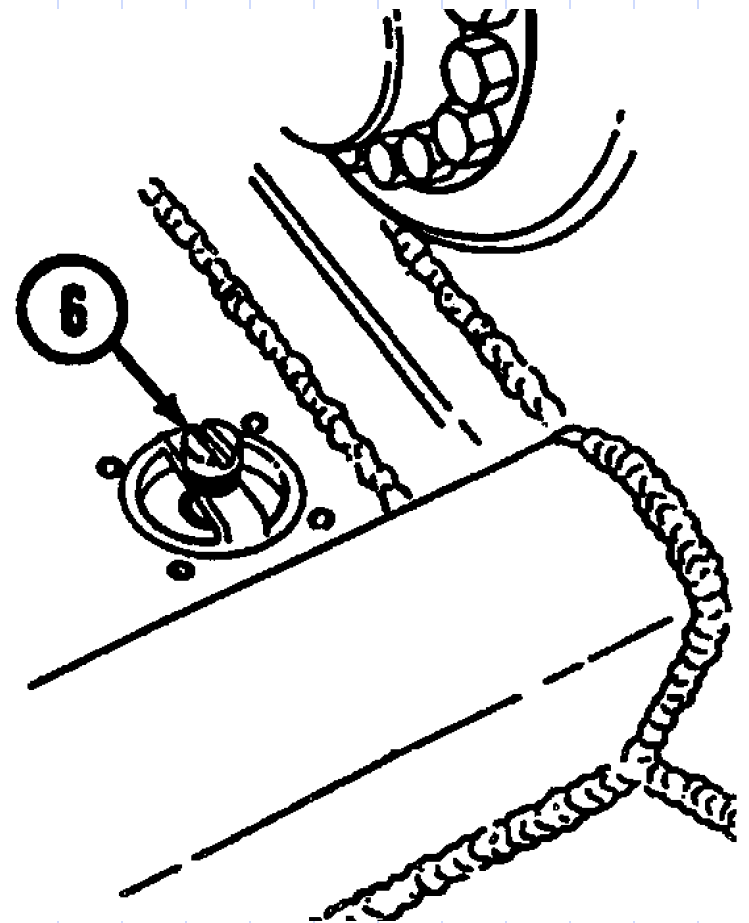
# Engine Compartment

- ◆ Air cleaner/indicator
- ◆ Exhaust system
- ◆ Radiator
- ◆ Steering unit



# Hull Drain Valve

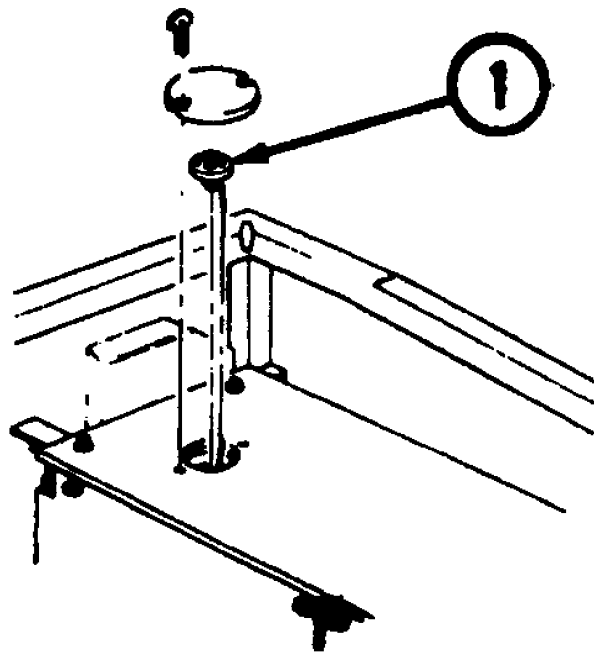
- ◆ Ensure drain valve is closed and securely seated against the hull.



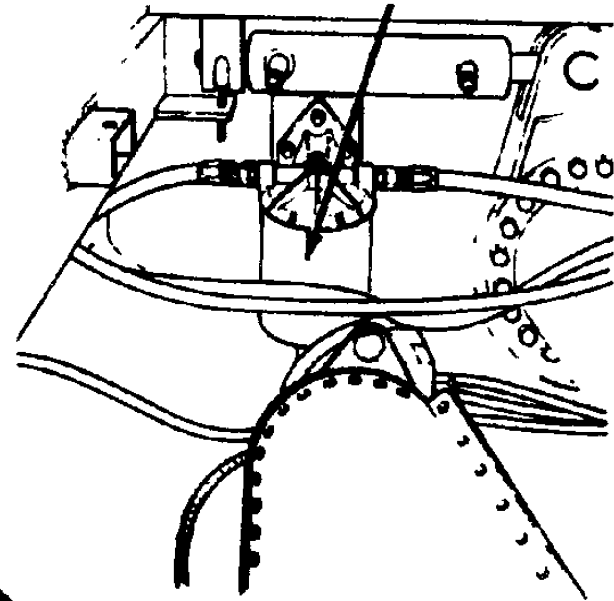
# Fuel System

- ◆ Inspect for loose, missing or broken hardware.

Fuel  
tank

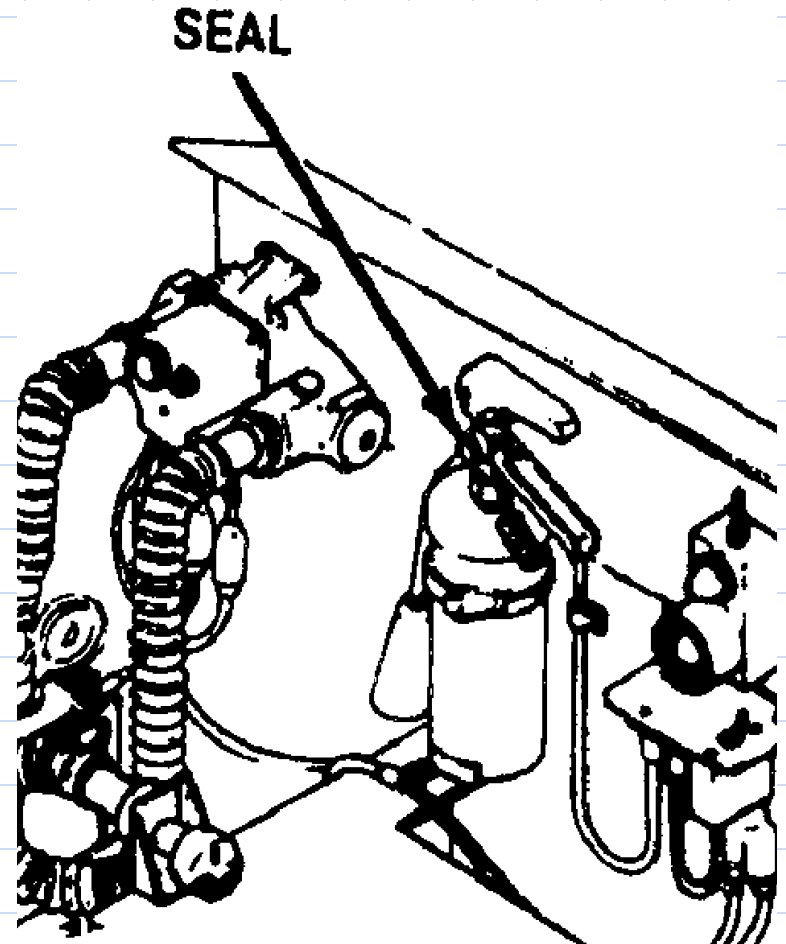


FUEL/WATER SEPARATOR



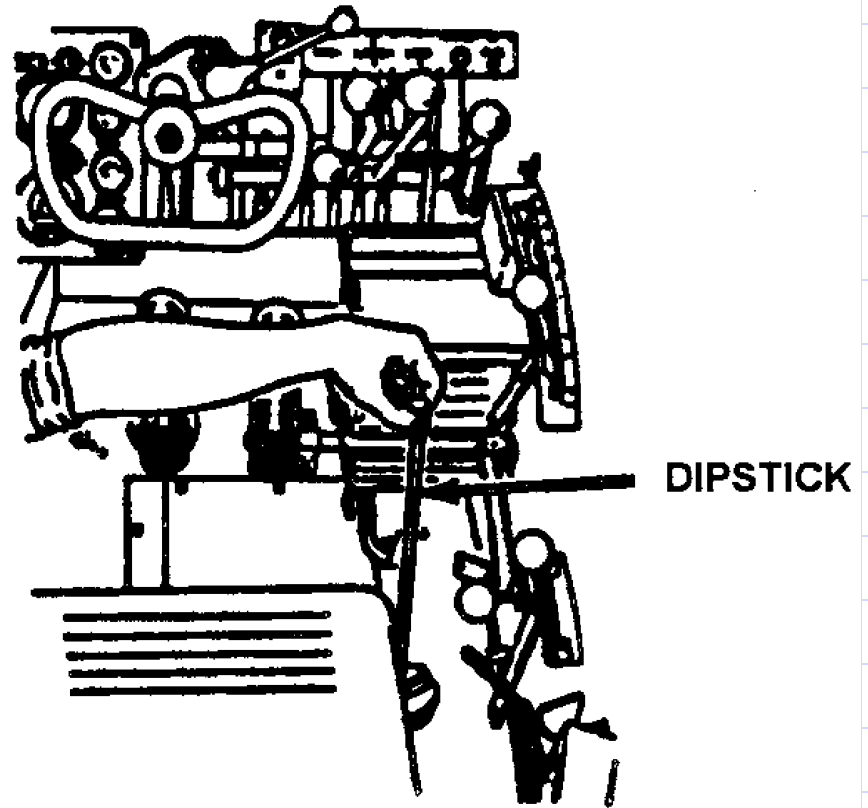
# Portable Fire Extinguisher

- ◆ Check pressure
- ◆ Lines and nozzles for cracks, corrosion, missing or damaged seal.



# Hydraulic Reservoir

- ◆ Check oil level with apron down and ejector fully retracted.
- ◆ Dipstick located in operators cab.

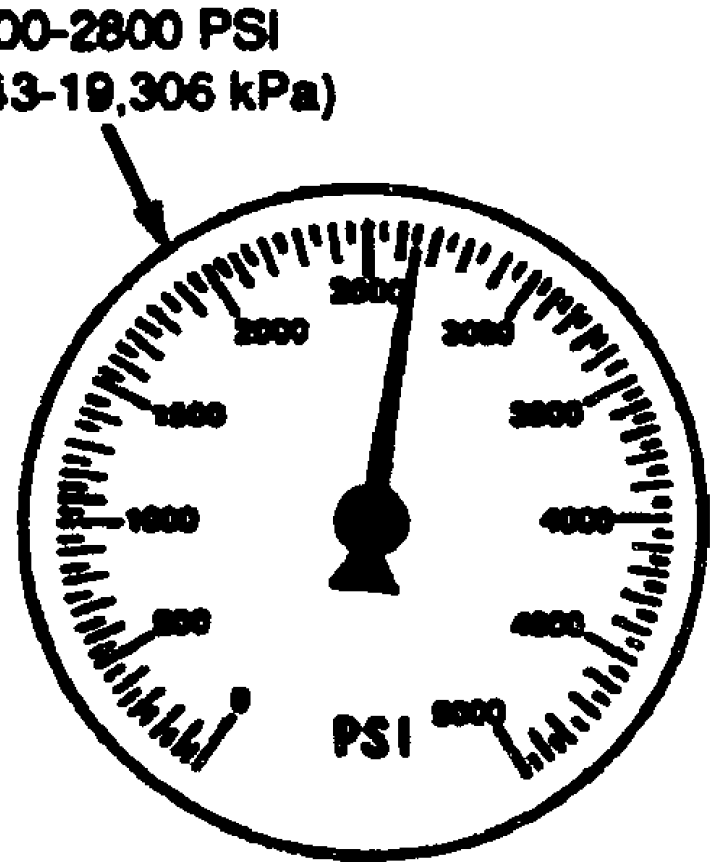


# Before Operation

- ◆ The following checks are performed with the engine running.

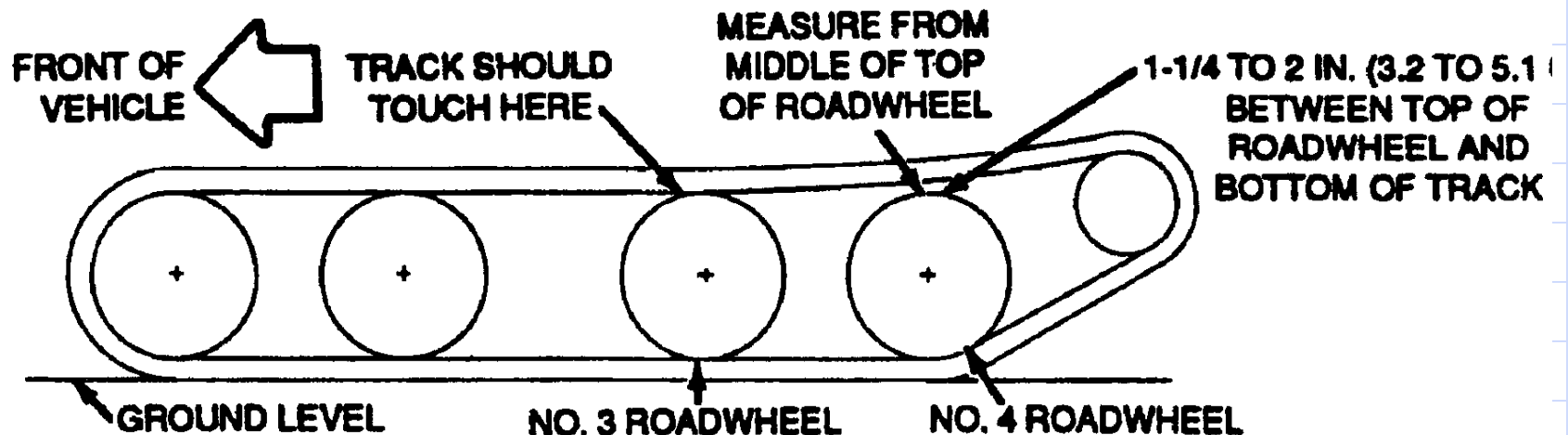
# Hydraulic Pressure Gage

- ◆ Engine speed 1500 rpm
- ◆ Should not read below 2800 psi



# Track Tension

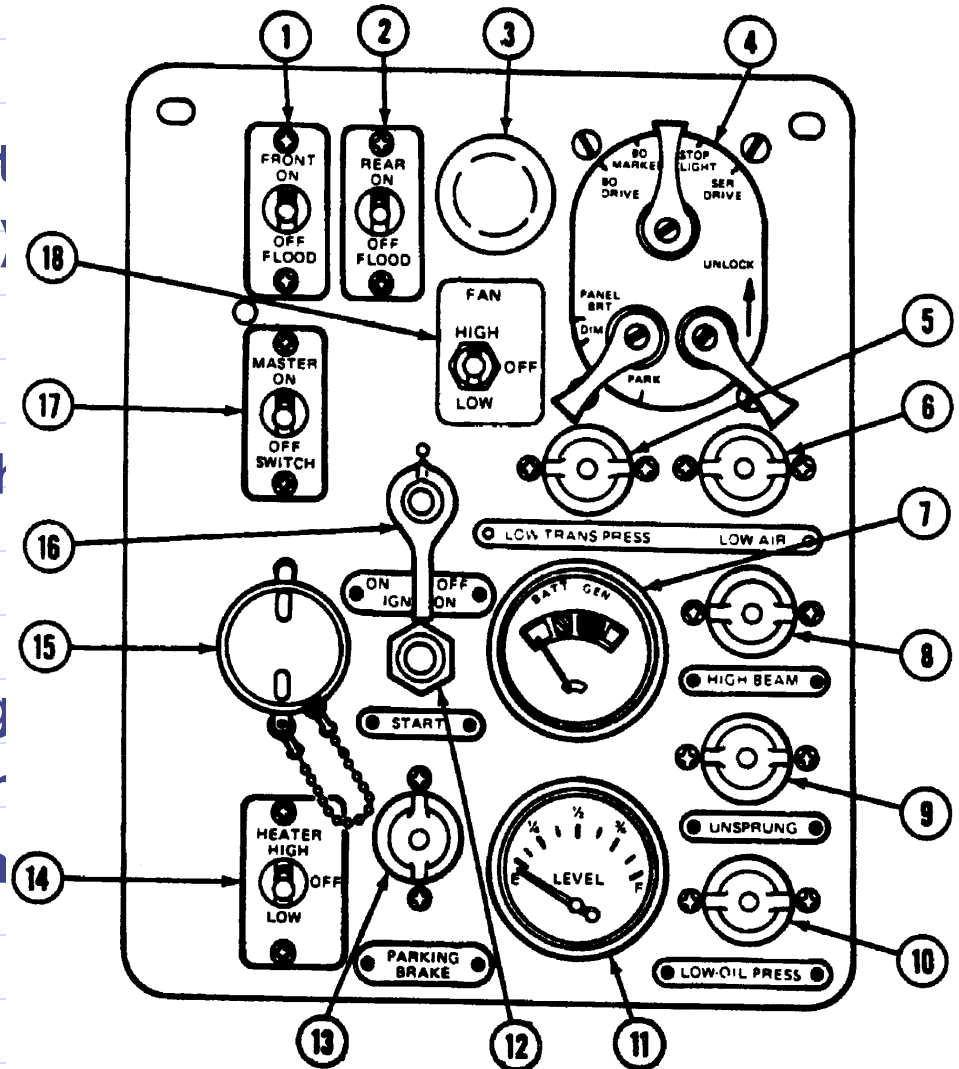
- ◆ Check track tension
- ◆ 1 1/4" - 2"
- ◆ M9 will not kneel,  
track to tight





# Switch Panel

1. Flood light switch(front)
2. Flood light switch(rear)
3. Panel light
4. Light switch assembly
5. Low trans pressure(light)
6. Low air indicator light
7. Batt. Gen. (indicator)
8. High beam indicator light
9. Unsprung indicator light
10. Low oil pressure indicator
11. Fuel level indicator



# Switch Panel



# Switch Panel

**12.** Start switch

**13.** Parking brake indicator

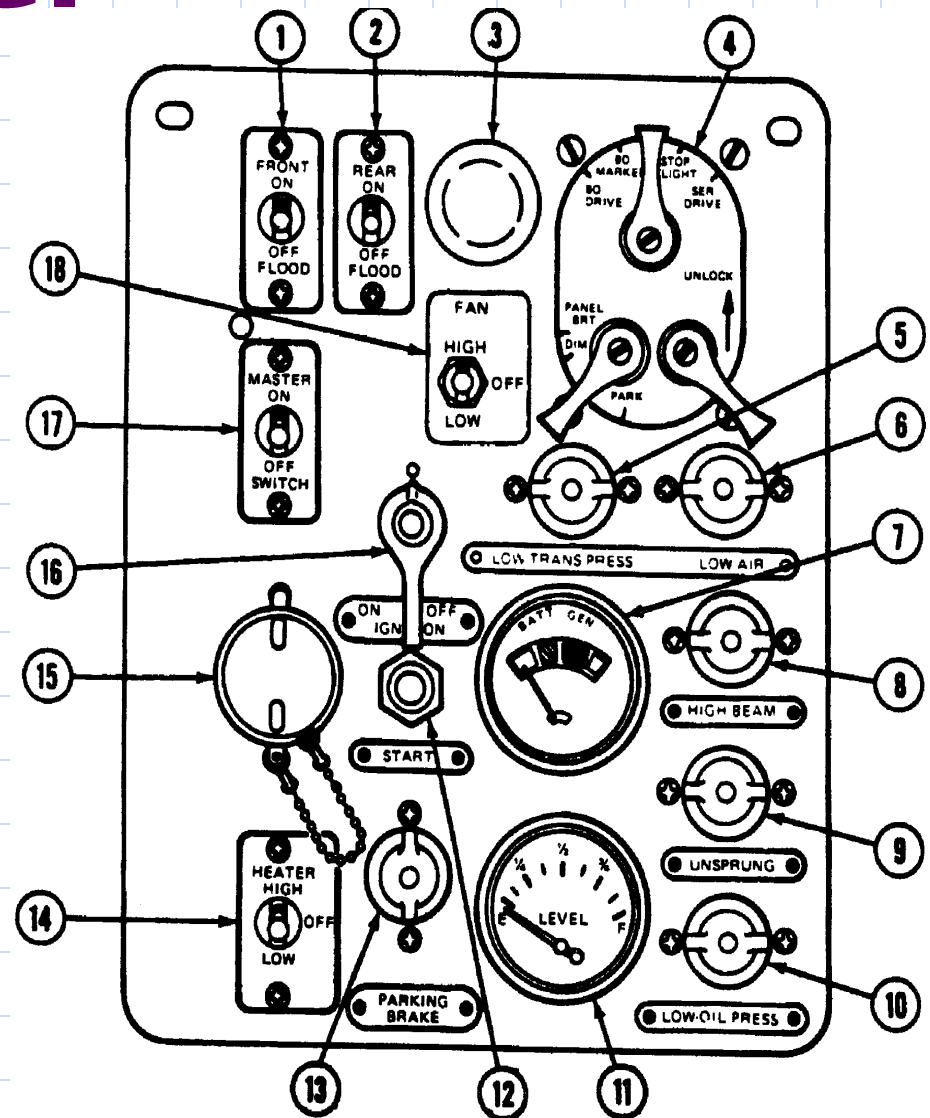
**14.** Heater switch

**15.** Utility outlet

**16.** Ignition on/off switch

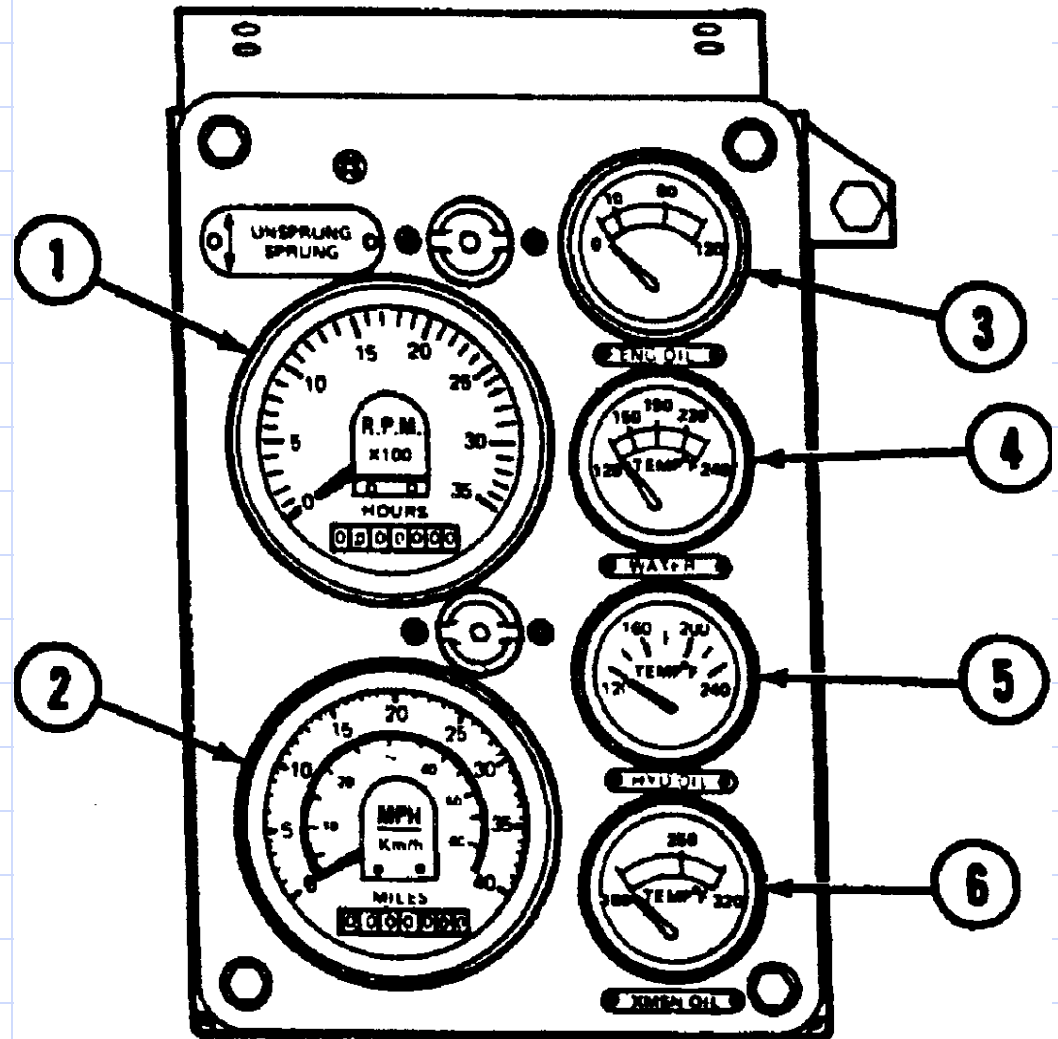
**17.** Master switch

**18.** Fan switch



# Gage Panel

1. Tachometer
2. Speedometer  
r/odometer
3. Engine oil  
pressure
4. Water  
temperature
5. Hydraulic oil  
temperature
6. Transmission  
oil  
temperature



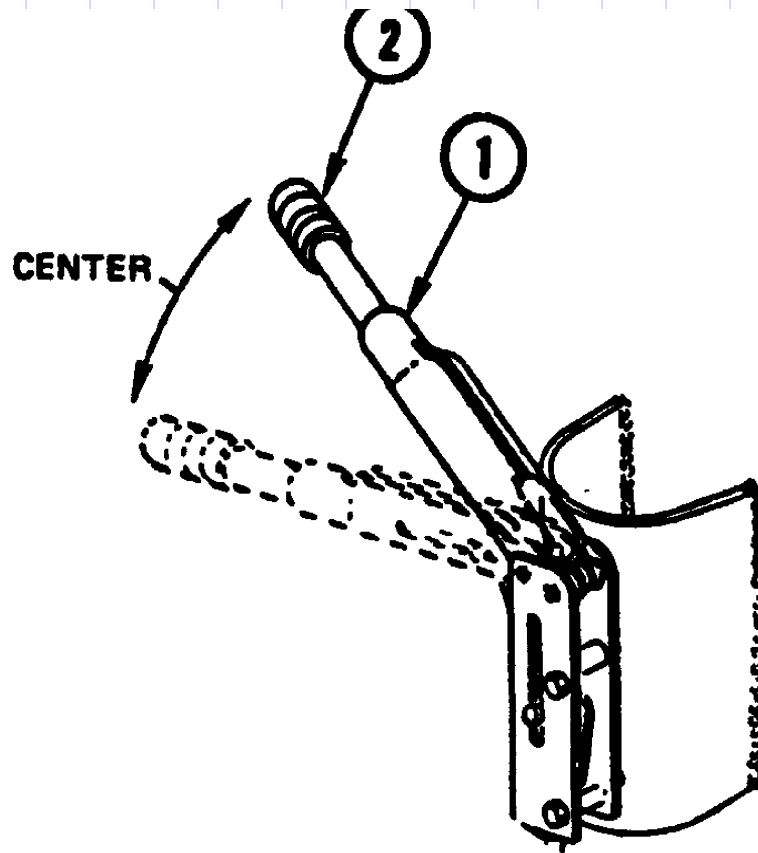
# Gauge Panel



# Gauges

- ◆ **EO pressure - 10 to 80 psi**
- ◆ **Coolant - 150 to 190 degrees F**
- ◆ **Hydro oil temp - Not exceed 240 degrees F**
- ◆ **Trany oil temp - 160 to 250 degrees F**
- ◆ **Warning buzzer**
  - **Low EO pressure**
  - **Parking brake engaged/in gear**
  - **Unsprung/reverse**

# Parking Brake

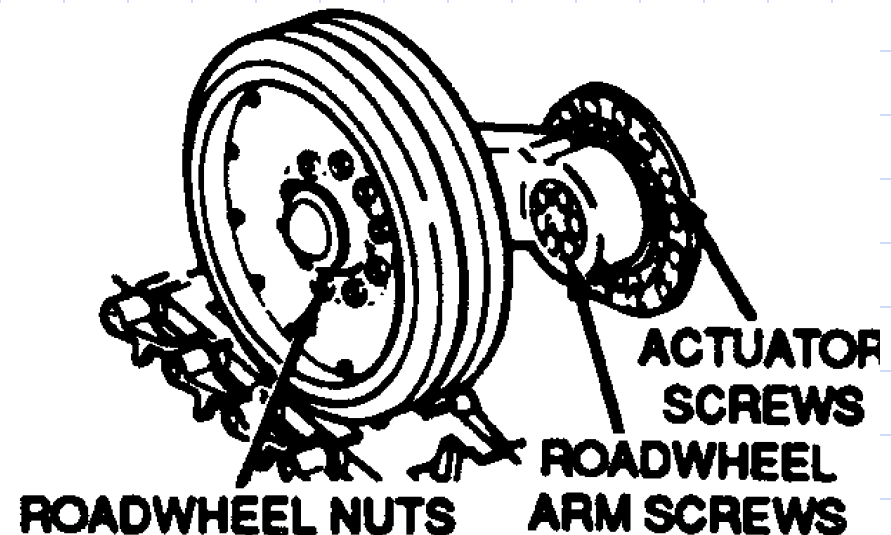


◆ **Must be set with engine running and service brake applied**

# Suspension

## ◆ During halts and after ops:

- Fell hub temperature
- Overheated hub indicates
  - ◆ Maladjustment
  - ◆ Inadequate lube
  - ◆ Bad bearing





# Winch



# Cutting edges

- ◆ **Inspect cutting edges**
- ◆ **Replace when  $\frac{1}{4}$  " from mold board**



# Road Wheels



- ◆ **Inspect for chunking and other damage**
- ◆ **Replace if over  $\frac{1}{2}$  running surface chunked out**
- ◆ **Flat spot**



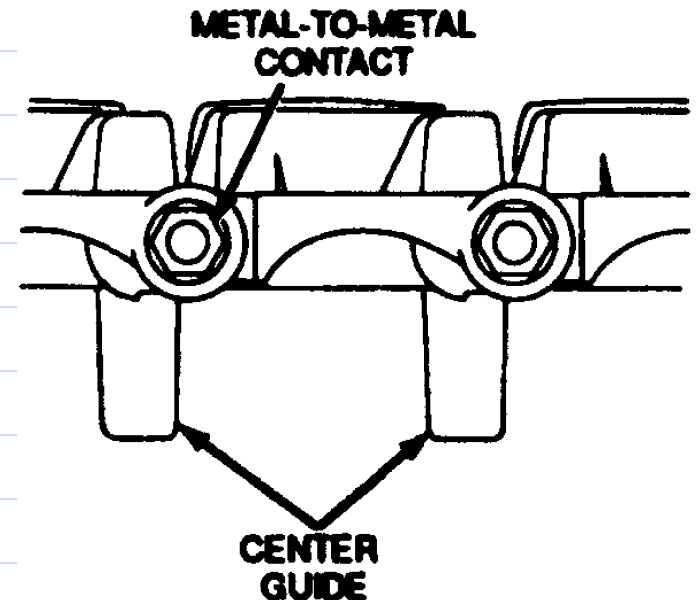
# Road Wheels



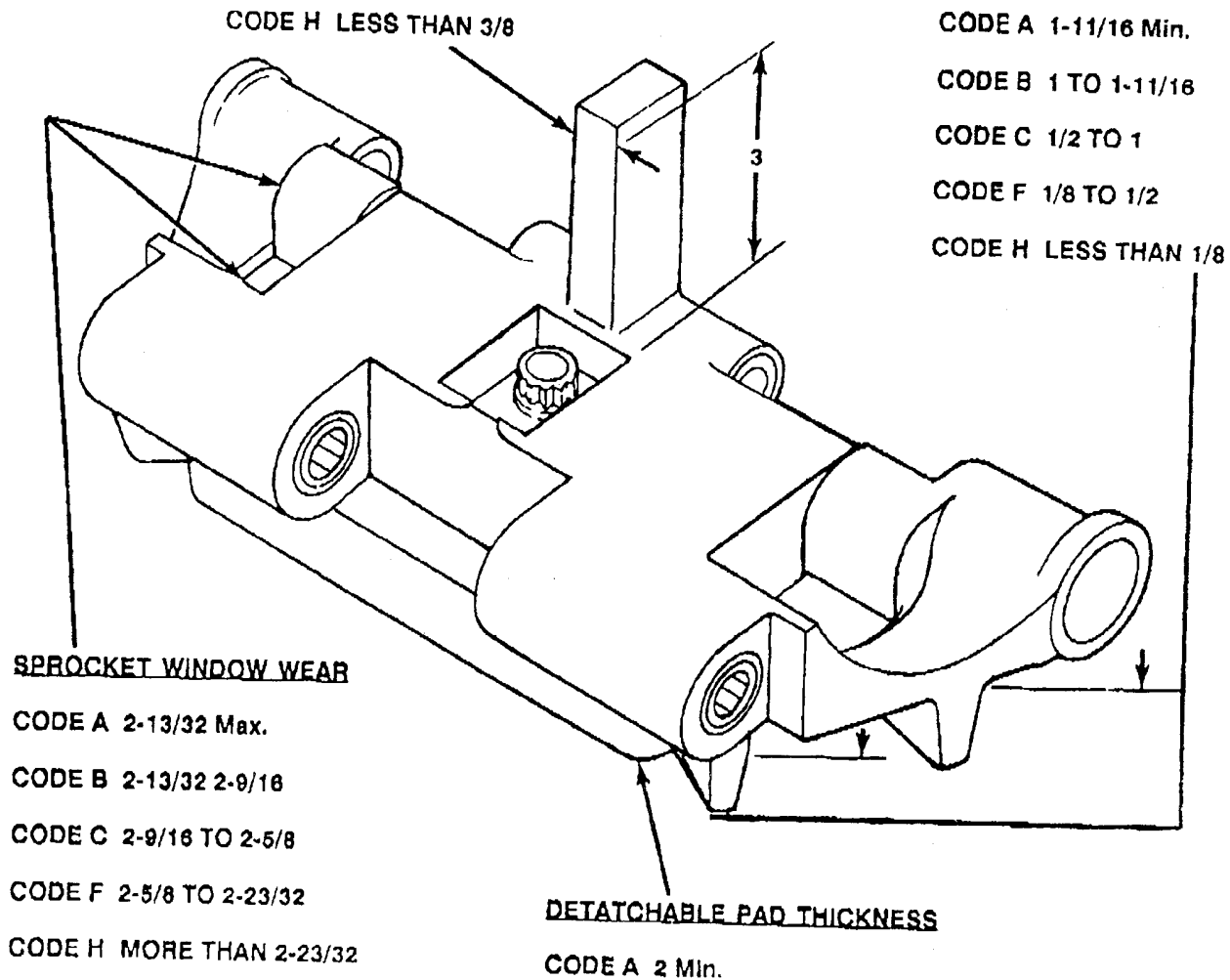
# Track

## ◆ Inspect/Replace track when:

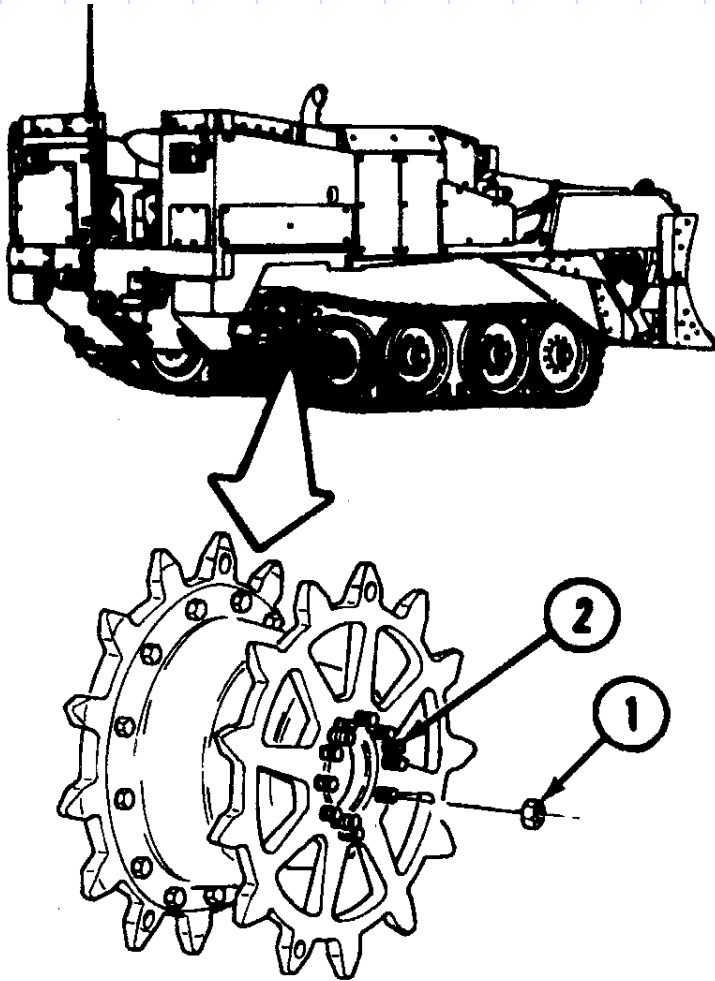
- Centerguide is less than  $\frac{3}{8}$ " thick/ $\frac{3}{4}$ " long
- Sprocket window more than  $2\text{-}\frac{23}{32}$ "
- Grouser height less than  $\frac{1}{8}$ "



# Track



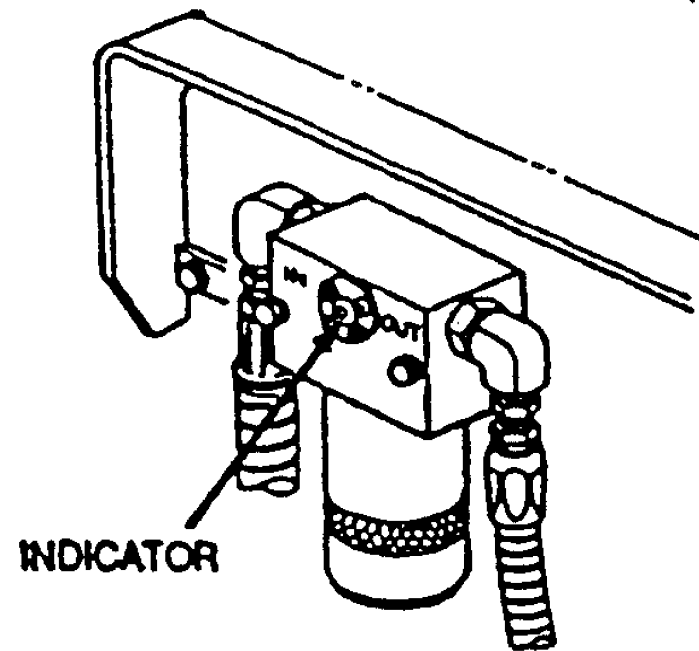
# Sprockets



- ◆ Reversible
- ◆ Wear indicators
- ◆ Reverse **BEFORE** wear shows in indicators

# High Pressure Filters

- ◆ Check before and during ops
- ◆ Indicators pop out reset and observe



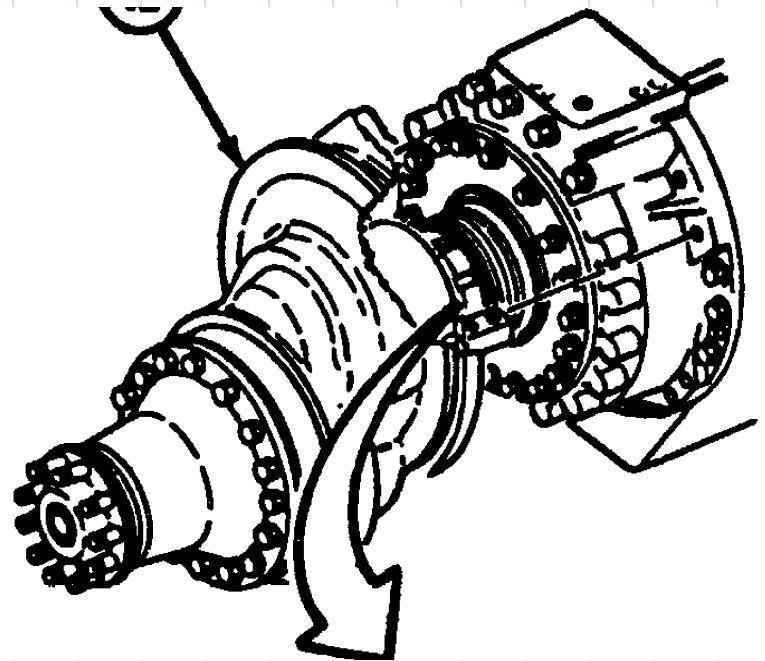


# High Pressure Filters



# Towing

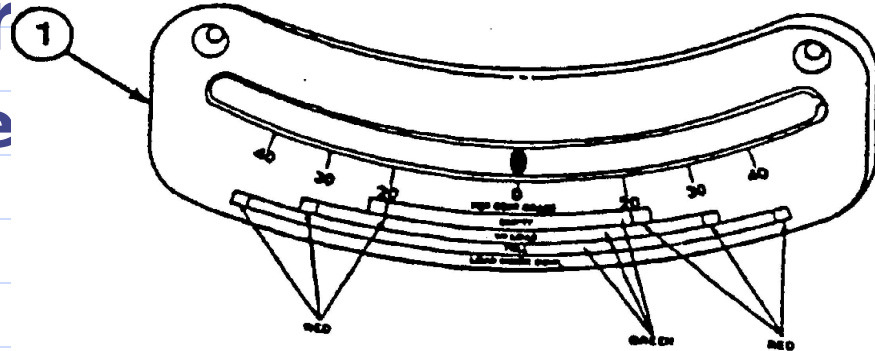
- ◆ **MUST disconnect final drives before towing**
- ◆ **Damage steering unit**
- ◆ **Tow from rear only**



# Inclinometers

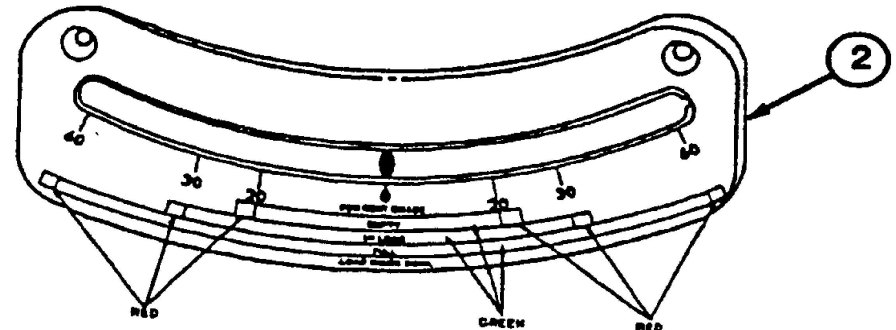
## ◆ Front inclinometer

- Measures side slope



## ◆ Side inclinometer

- Measures grade



# Inclinometers

## ◆ Front Inclinometer

- Bowl empty 20%
- Bowl  $\frac{1}{4}$  full 30%
- Bowl full 40%

## ◆ Side Inclinometer

- Bowl empty 20%
- Bowl  $\frac{1}{4}$  full 30%
- Bowl full 60%

# **Straight Dozing**

- ◆ **Bowl full**
- ◆ **Un-sprung**
- ◆ **CB**
- ◆ **Utilize suspension control levers**
- ◆ **Using steering wheel will throw track**

# Tilt Dozing

- ◆ **Un-sprung**
- ◆ **GS**
- ◆ **Cut 1 to 2 inches deep**
- ◆ **5 degrees left or right**

# Questions

- ◆ Are there any questions at this time?
- ◆ We will now conduct a walk around with the M9 ACE.



# M9 ACE

